



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/720,372	03/09/2001	Kenji Kubomura	KUBOMURA-1	2532
1444	7590	05/28/2004	EXAMINER	
BROWDY AND NEIMARK, P.L.L.C. 624 NINTH STREET, NW SUITE 300 WASHINGTON, DC 20001-5303			PIERCE, JEREMY R	
			ART UNIT	PAPER NUMBER
			1771	

DATE MAILED: 05/28/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/720,372

Applicant(s)

KUBOMURA ET AL.

Examiner

Jeremy R. Pierce

Art Unit

1771

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 16 March 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-4, 7, 21-23 and 28-30 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-4, 7, 21-23 and 28-30 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on February 20, 2004 has been entered.

Response to Amendment

2. Applicant's amendment of February 20, 2004 has been entered. Claims 1-4, 7, and 23 have been amended. Claims 31 and 32 have been cancelled. The amendment is sufficient to withdraw the 35 USC 112, 102, and 103 rejections set forth in sections 4, 6-8, 10, and 11 of the last Office Action due to the new limitations defined in the amended claims. Additionally, claim 23 has been amended to withdraw the objection set forth in section 2 of the last Office Action.

Claim Rejections - 35 USC § 112

3. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

Art Unit: 1771

4. Claims 1-4, 7, 21-23, and 28-30 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

Claims 1 and 4 recite "said matrix resin is used to control the coefficient of linear expansion of the composite material such that said coefficient approaches substantially zero." However, the specification does not disclose the matrix resin is used to control the coefficient of linear expansion of the composite material. Although a thermal expansion ratio of 60 ppm/°C is given for the epoxy resin, there is no disclosure as to how this relates to the coefficient of linear expansion of the composite material.

5. Claims 1-4, 7, 21-23, and 28-30 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention.

Claims 1 and 4 recite "said matrix resin is used to control the coefficient of linear expansion of the composite material such that said coefficient approaches substantially zero." There is no teaching in the specification of the amount of resin required to perform such a function on any particular group of fibers. Applicant provides several Tables in the specification that show the effect on the coefficient of linear expansion when fibers having a negative coefficient are mixed with fibers having a positive

Art Unit: 1771

coefficient. But there is no teaching in the specification describing how the resin is combined with these fibers to create a composite material having a coefficient of linear expansion of substantially zero. How is the resin applied to the fibers? How much resin is used? Applicant claims the novelty of the present invention lies in using the resin matrix to control the coefficient of linear expansion, however, a person having ordinary skill in the art is not taught how to incorporate the matrix resin so that it controls the coefficient of linear expansion.

Claim Rejections - 35 USC § 103

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

7. Claims 1-3 and 7 are rejected under 35 U.S.C. 103(a) as being unpatentable over Miyadera et al. (U.S. Patent No. 4,446,191) in view of Nelson (U.S. Patent No. 3,877,034).

Miyadera et al. teach a heat resistant laminate with a low expansion coefficient (column 1, lines 5-7). The laminate is made from composite fabrics comprising 30-95% by weight of aromatic polyamide and 5-70% by weight of glass fibers (column 1, lines 41-47). The glass fibers have a positive coefficient of thermal expansion, but the aromatic polyamide fibers control the thermal expansion of the composite because they have a negative coefficient of thermal expansion. The composite fabric may be woven

(column 1, line 64). The weave may be made from alternating one by one aromatic polyamide fiber and glass fiber (column 2, lines 4-7). Also, the weave may be formed from twisting fibers of aromatic polyamide and glass together into a yarn, then weaving the yarn (column 2, lines 8-27). The composite fabrics are then impregnated with a resin (column 3, lines 31-36), and optionally made into a prepreg by incorporating hardener with the resin (column 3, lines 42-45). Miyadera et al. do not specifically teach the epoxy resin is used to control the coefficient of linear expansion to substantially zero. Nelson teaches that zero coefficient of linear expansion may be achieved by balancing negative coefficient fibers with a relative amount of epoxy resin (column 10, lines 26-30). It would have been obvious to a person having ordinary skill in the art at the time of the invention to factor in the epoxy resin of as a consideration in creating coefficient of linear expansion approaching zero, as taught by Nelson, in order to produce a laminate material with a coefficient approaching zero, as desired by Miyadera et al. (column 1, lines 26-27).

8. Claims 1, 2, 4, 21, and 23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kashima et al. (U.S. Patent No. 5,462,791) in view of Nelson.

Kashima et al. disclose a laminate of fabrics composed of glass fibers and/or polyethylene fibers (column 7, lines 14-64). Each fabric layer may be composed of the same material, alternating the positive coefficient fibers with the negative coefficient fibers, or each fabric may be composed of two different fibers. The fabric layers are then impregnated with an epoxy resin (column 4, lines 27-43). Kashima et al. teach canceling out the coefficients of thermal expansion to equal zero (column 6, lines 4-6),

Art Unit: 1771

but Kashima et al. do not specifically teach the epoxy resin is used to control the coefficient of linear expansion to substantially zero. Nelson teaches that zero coefficient of linear expansion may be achieved by balancing negative coefficient fibers with a relative amount of epoxy resin (column 10, lines 26-30). It would have been obvious to a person having ordinary skill in the art at the time of the invention to factor in the epoxy resin as a consideration in creating coefficient of linear expansion approaching zero, as taught by Nelson, in order to produce a laminate material with a coefficient approaching zero, as desired by Kashima et al.

9. Claims 1, 2, 4, 21, 23, 28, and 30 are rejected under 35 U.S.C. 103(a) as being unpatentable over Leibowitz (U.S. Patent No. 4,689,110) in view of Nelson.

Leibowitz discloses a laminate with alternating layers of PTFE material and graphite impregnated with an epoxy resin (column 2, lines 30-48). The high coefficient of expansion of the PTFE is controlled by the graphite layers (column 4, lines 40-65). Kashima et al. disclose a laminate of fabrics composed of glass fibers and/or polyethylene fibers (column 7, lines 14-64). Each fabric layer may be composed of the same material, alternating the positive coefficient fibers with the negative coefficient fibers, or each fabric may be composed of two different fibers. The fabric layers are then impregnated with an epoxy resin. Leibowitz discloses the epoxy resin balances out the graphite layers to a coefficient of linear expansion close to zero (column 4, lines 46-48), but Leibowitz does not specifically teach the epoxy resin is used to control the coefficient of linear expansion of the laminate to substantially zero. Nelson teaches that zero coefficient of linear expansion may be achieved by balancing negative coefficient

Art Unit: 1771

fibers with a relative amount of epoxy resin (column 10, lines 26-30). It would have been obvious to a person having ordinary skill in the art at the time of the invention to factor in the epoxy resin as a consideration in creating coefficient of linear expansion approaching zero, as taught by Nelson, in order to produce a laminate material with a coefficient approaching zero, as desired by Leibowitz.

10. Claims 3, 7, 22, and 29 are rejected under 35 U.S.C. 103(a) as being unpatentable over Leibowitz in view Nelson as set forth above in section 9, and further in view of Yuan (U.S. Patent No. 4,020,209).

Leibowitz does not disclose the fabrics to be woven in a triaxial configuration. Yuan teaches that triaxial fabric can be used to create a range of designs and parameters of strength, density, weight, and porosity (column 2, lines 37-61) and that triaxial fabric is used in preparing circuit boards (column 4, lines 6-7). It would have been obvious to one having ordinary skill in the art to use a triaxial weave in the fabrics of Leibowitz in order to create the fabrics with a wide range of designs and parameters, as taught by Yuan.

11. Claims 28 and 29 are rejected under 35 U.S.C. 103(a) as being unpatentable over Miyadera et al. in view of Nelson as set forth above in section 7, and further in view of Leibowitz.

Miyadera et al. do not teach using carbon or polyparaphenylene benzo oxazole fibers as the fibers with a negative coefficient of expansion. Leibowitz teaches that the use of graphite fibers greatly strengthens the circuit board structure (column 5, lines 11-13). It would have been obvious to one having ordinary skill in the art to use graphite

fibers as the fibers with a negative coefficient of expansion in the laminate of Miyadera et al. in order to increase the strength of the laminate, as taught by Leibowitz.

Response to Arguments

12. Applicant's arguments filed March 16, 2004 (after the Advisory Action) have been fully considered but they are not persuasive.

13. Applicant argues that there is support for the new limitation that the epoxy resin is used to control the coefficient. Applicant asserts that it is disclosed that the epoxy resin expands at a rate of 60 ppm/°C, and there are nine different types of reinforcing fibers that all have negative coefficients in Table 1 and several more in Table 2.

Applicant argues that because all of the coefficients of linear expansions of the fibers disclosed are negative, a person of ordinary skill in the art would understand that the only way that the coefficient could be zero is if the matrix resin having a positive coefficient is used to control the coefficients. But this argument ignores the fact that the specification does not require the overall coefficient to equal zero. The specification teaches that the coefficient is controlled (page 2), but does not indicate that all examples must result in an overall laminate whose coefficient is zero. So a person having ordinary skill in the art would not be forced to make the assumption that because some examples of fibers have a negative coefficient, that one must use positive coefficient resin to form a composite with a coefficient of zero. Furthermore, in Tables 2, 4, and 6, resin is not a factor used to control the coefficient of thermal expansion. The ratio of two different fibers is used to control the change in coefficient values.

Applicant does not disclose in the specification that the epoxy resin is used to control the coefficient. Upon reading Tables 2, 4, and 6, it appears that the coefficient is controlled by varying the ratio of positive coefficient fibers to negative coefficient fibers. Nowhere is there disclosure on the effect that epoxy resin has when added to these fibers. No data is given as to how epoxy resin is used, in conjunction with these fibers, to control the coefficient of the overall laminate so that it equals zero. Even if one were to assume that the epoxy resin is used to control the coefficient, there is nothing to enable one skilled in the art the ability to practice the invention to achieve the claimed result.

14. Applicant's arguments filed on February 20, 2004 (before the Advisory Action) have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jeremy R. Pierce whose telephone number is (571) 272-1479. The examiner can normally be reached on Monday-Thursday 7-4:30 and alternate Fridays 7-4.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Terrel Morris can be reached on (571) 272-1478. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for

Art Unit: 1771

published applications may be obtained from either Private PAIR or Public PAIR.

Status information for unpublished applications is available through Private PAIR only.


For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should

you have questions on access to the Private PAIR system, contact the Electronic

Business Center (EBC) at 866-217-9197 (toll-free).

JRP

JRP


ELIZABETH M. COLE
PRIMARY EXAMINER